Burkay Genç

Assistant Professor at Hacettepe University

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Summary

I am aspiring to become a full professor of Computer Science. I focus my research on computational geometry and policy and strategy studies. I am also interested in game design, mobile application development and web programming.

Experience

Assistant Professor at   Hacettepe University

September 2014 - Present (1 year 5 months)

   Social Network Analysis Exploratory Data Analysis Big Data Data Mining

Assistant Professor at   TED University

February 2012 - September 2014 (2 years 8 months)

   Teaching and research.

Assistant Professor at   Izmir University of Economics

February 2009 - February 2012 (3 years 1 month)

   Teaching and Research. - Discrete Structures of Mathematics - Theory of Computation - Introduction to Computer Games - Mobile Application Development - Introduction to Computer Science - Introduction to IT and Computers - Quality Control and Reliability

Teaching Assistant at   University of Waterloo

September 2003 - June 2007 (3 years 10 months)

   Teaching and Research Assistant. Thesis: Reconstructing Orthogonal Polyhedra

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Publications

Covering points with orthogonally convex polygons

Computational Geometry: T&A   2011

Authors: Burkay Genç, Cem Evrendilek, Brahim Hnich

   In this paper, we address the problem of covering points with orthogonally convex polygons. In particular, given a point set of size n on the plane, we aim at finding if there exists an orthogonally convex polygon such that each edge of the polygon covers exactly one point and each point is covered by exactly one edge. We show that if such a polygon exists, it may not be unique. We propose an O(nlogn) algorithm to construct such a polygon if it exists, or else report the non-existence in the same time bound. We also extend our

algorithm to count all such polygons without hindering the overall time complexity. Finally, we show how to construct all k such polygons in O(nlogn+kn) time. All the proposed algorithms are fast and practical.

Reconstructing orthogonal polyhedra from putative vertex sets

Computational Geometry: T&A   2011

Authors: Burkay Genç, Therese Biedl

In this paper we study the problem of reconstructing orthogonal polyhedra from a putative vertex set, i.e., we are given a set of points and want to find an orthogonal polyhedron for which this is the set of vertices. This is well-studied in 2D; we mostly focus on 3D, and on the case where the given set of points may be rotated beforehand. We obtain fast algorithms for reconstruction in the case where the answer must be orthogonally convex.

Stoker's Theorem for Orthogonal Polyhedra

IJCGA   2011

Authors: Burkay Genç, Therese Biedl

Stoker's theorem states that in a convex polyhedron, the dihedral angles and edge lengths determine the facial angles if the graph is fixed. In this paper, we study under what conditions Stoker's theorem holds for orthogonal polyhedra, obtaining uniqueness and a linear-time algorithm in some cases, and NP-hardness in others.

Covering points with orthogonal polygons

Discrete Applied Mathematics   2014

Authors: Cem Evrendilek, Burkay Genç, Brahim Hnich

We address the problem of covering points with orthogonal polygons. Specifically, given a set of n points in the plane, we investigate the existence of an orthogonal polygon such that there is a one-to-one correspondence between the points and the edges of the polygon. In an earlier paper, we have shown that constructing such a covering with an orthogonally convex   polygon, if any, can be done in O(nlogn) time. In case an orthogonally convex polygon cannot cover the point set, we show in this paper that the problem of deciding whether such a point set can be covered with any orthogonal polygon is NP-complete. The problem remains NP-complete even if the orientations of the edges covering each point are specified in advance as part of the input.

Covering oriented points in the plane with orthogonal polygons is NP-complete

Electronic Notes in Discrete Mathematics   2010

Authors: Burkay Genç, Cem Evrendilek, Brahim Hnich

We address the problem of covering points with orthogonal polygons. Specifically, given a set of n grid-points in the plane each designated in advance with either a horizontal or vertical reading, we investigate the existence of an orthogonal polygon covering these n points in such a way that each edge of the polygon covers exactly one point and each point is covered by exactly one edge with the additional requirement that the reading associated with each point dictates whether the edge covering it is to be horizontal or vertical. We show that this problem is NP-complete.

A multi-graph approach to complexity management in interactive graph visualization

Elsevier   February 2006

Authors: Ugur Dogrusoz, Burkay Genç

In this paper we describe a new, multi-graph approach for development of a comprehensive set of complexity management techniques for interactive graph visualization tools. This framework facilitates efficient implementation of management of multiple associated graphs with navigation links and nesting of graphs as well as ghosting, folding and hiding of unwanted graph elements. The theoretical analyses show that the involved data structures and operations on them are quite efficient, and an implementation in a graph drawing tool has proven to be successful.

A layout algorithm for signaling pathways

Authors: Burkay Genç, Ugur Dogrusoz

Visualization is crucial to the effective analysis of biological pathways. A poorly laid out pathway confuses the user, while a well laid out one improves the user's comprehension of the underlying biological phenomenon. We present a new, elegant algorithm for layout of biological signaling pathways. Our algorithm uses a force-directed layout scheme, taking into account directional and rectangular regional constraints enforced by different molecular interaction types and subcellular locations in a cell. The algorithm has been successfully implemented as part of a pathway visualization and analysis toolkit named Patika, and results with respect to computational complexity and quality of the layout have been found satisfactory. The algorithm may be easily adapted to be used in other applications with similar conventions and constraints as well.

Courses

Bachelor of Science, Industrial Engineering

Bilkent University
Operations Research
Quality Control and Reliability
Statistics
Operations Management

PhD, Computer Science

University of Waterloo
Polyhedra
Operating Systems

Master of Science, Computer Engineering

Bilkent University
Algorithms
Computational Geometry
Cryptography

Languages

English (Full professional proficiency)

Turkish (Native or bilingual proficiency)

Skills & Expertise

Computer Science
Algorithms
Computational Geometry
Social Network Analysis
Exploratory Data Analysis
Mobile Applications
Android
Theory of Computation
Programming
Game Design
Java
LaTeX
JavaScript
MySQL
PHP
Python

Education

University of Waterloo
PhD, Computer Science, 2003 - 2008

Bilkent University
Master of Science, Computer Engineering, 2000 - 2002

Bilkent University
Bachelor of Science, Industrial Engineering, 1996 - 2000

Interests

computational geometry,mobile application development,computer game design, data sciences, social network analysis

Volunteer Experience

Computer Technologies Teacher at   High schools
January 1997 - January 1999 (2 years 1 month)

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